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ABSTRACT

Results are reported from an investigation of the implementation and effects of The Adaptive Learning Environments Model (ALEM), a program designed to provide special education services for mainstreamed handicapped students in regular classroom settings on a full-time basis. ALEM includes components of prescriptive instruction with informal approaches to foster inquiry, independence, and social cooperation. Effects of implementing ALEM in 26 mainstreaming classrooms were evaluated via measurements of degree of program implementation, classroom process outcomes, student academic and attitudinal outcomes, and teacher and parent attitudes and assessments. Results are detailed for four major topics: degree of program implementation, relationship between implementation and selected student outcomes, relationship between degree of program implementation and classroom processes, and teacher and parent attitudes and assessment of program impact. Overall, results supported the feasibility and efficacy of a full time mainstreaming approach for moderately handicapped students in the ALEM classrooms. Among policy implications noted is that more restrictive placement should be considered only after a full time mainstreaming approach has been tried and found ineffective. (CL)

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AN INVESTIGATION OF THE IMPLEMENTATION AND EFFECTS OF A FULL-TIME MAINSTREAMING PROGRAM IN A LARGE URBAN SCHOOL SYSTEM

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1984

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ABSTRACT

Results are reported from an investigation of the implementation and effects of a program designed to provide special education services for mainstreamed handicapped students in regular classroom settings on a full-time basis. In addition to a discussion of the rationale and design of the program, findings on the degree of implementation, classroom processes, student achievement and attitudinal outcomes, and teacher and parent attitudes are reported. The educational and policy implications of the findings also are discussed.

AN INVESTIGATION OF THE IMPLEMENTATION AND EFFECTS OF A FULL-TIME MAINSTREAMING PROGRAM IN A LARGE URBAN SCHOOL SYSTEM

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The purpose of this paper is to discuss the findings from a study of the implementation and effects of a mainstreaming program in a large urban school system. The overall goal of the study was to investigate the feasibility and efficacy of the program in providing educational services for moderately handicapped students who were integrated in regular classroom settings on a full-time basis. The implications for further operationalization of the "least restrictive environment" mandate of the Education for All Handicapped Children Act (Public Law 42-142) were of particular interest.

Although serious policy and implementation efforts were at work even before the passage of Public Law 94-142, results from mainstreaming studies to date have not been supportive of attempts to make the educational vision a reality. On the contrary, they consistently have pointed to several major policy and educational programming barriers to wide-scale provision of "appropriate" education for special needs students in the "least restrictive environment." Many have contended that the inadequacy of most present educational delivery systems for accommodating the instructional and management requirements for full-time mainstreaming of students with special needs in regular classes has been a critical stumbling block and a major challenge for educators (Reynolds & Wang, 1981). Thus, a central task for the

second decade of the enactment of Public Law 94-142, as we see it, is the development of alternative educational delivery systems that are feasible and effective in making instructional provisions for the individual learning needs of special needs students and their general education peers. The work described in this paper was designed as one such attempt.

The paper consists of three major sections. First, the principles underlying the design and objectives of the mainstreaming program are briefly described. The design and major findings of the study are then presented. The final section of the paper consists of a discussion of the implications for implementation of effective mainstreaming school learning environments.

THE MAINSTREAMING PROGRAM

The program known as the Adaptive Learning Environments Model (ALEM) was the mainstreaming program implemented in the present study. It can be characterized as a full-time mainstreaming program that utilizes an adaptive approach to meet the instructional needs of both mainstreamed special education students and their general education peers in regular classes (Wang, 1981).

Use of an adaptive instruction approach to deliver effective instructional services for special needs students in regular classes has come to be recognized by many as an alternative for implementation of the "least restrictive environment" mandate (e.g., Heller, Holtzman, & Messick, 1982). In fact, the use of adaptive instruction to improve students' chances for

schooling success is not new (Grinder & Nelsen, in press). It has been the hallmark of effective special education programs implemented in more restrictive settings such as self-contained, special education classes or resource rooms.

Several principles provided the framework for the design and evaluation of the ALEM are briefly discussed here to establish the context for the work reported in this paper.

1. Educational programs that recognize the "special" needs of each student in the regular classroom, and make instructional provisions to accommodate those needs, are a direct application of the principle of "appropriate" educational services in the "least restrictive environment."

2. A basic condition for effective mainstreaming is establishment of environments in regular classes where special needs students are integrated socially and academically with their general education peers, and where special and general education students alike are provided with equal access to available instructional resources and equal opportunities to succeed socially and academically.

3. When instructional provisions are made available by regular and specialized professional staff to meet the "special" learning needs of each individual student, in the same setting, and on a regular basis, all students, general and mainstreamed special education,

are more likely to experience learning success. Moreover, in such environments, the focus is on educational intervention rather than placement, and individual differences tend to be viewed as the norm rather than the exception. As a result, all students, but particularly those requiring special education services, are less likely to develop perceptions of themselves as "exceptions" or to be stigmatized because of their special needs.

4. As individuals, general education students as well as special education students learn in different ways and require varying amounts of instruction and time to learn. The effective provision of instruction that is adaptive to student differences necessitates the use of a variety of instructional methods and learning experiences in order to adequately meet the diverse learning needs of individual students.

5. A basic requirement of effective programming is to adapt instruction to individual differences in students, while also fostering in students the ability to a sume self-responsibility for making necessary adaptations as they learn and to manage their own learning and classroom behaviors. In this vein, the term "adaptive" refers to modification of the learning environment to meet individual learning needs and of each student's capabilities to learn successfully in the environment.

6. Essentially all learning involves both external and internal adaptation. External adaptation occurs in the ideas and tasks that are to be learned and in the modes and forms in which new task content is presented to the learner. Internal adaptation takes place in the mind of the learner as new tasks are assimilated and internal mental structures are modified to accommodate the tasks. What an individual student thinks, perceives, and processes during the learning of a task determines the manner, process, and effort (motivation and attitude) with which the task is performed, as well as the persistence and resourcefulness with which the social and intellectual requirements of learning tasks are successfully met.

Thus, it is based on the principles discussed above, that the ALEM was implemented in the study as a mainstreaming program for serving special needs students in regular classroom settings.

Briefly, the ALEM is a comprehensive educational program designed with the overall goal of providing learning experiences that are adaptive to student differences (Wang, 1980a). It is a product of the systematic integration of aspects of prescriptive instruction that have been shown to be effective in facilitating basic skills mastery (Bloom, 1976; Glaser, 1977; Rosenshine, 1979) with aspects of informal education that generate attitudes and processes of inquiry, independence, and social cooperation (Johnson, Maruyama, Johnson, Nelson, & Skon, 1981; Marshall, 1981; Peterson, 1979). Among the expected outcomes of the program for each student are provision of opportunities to successfully acquire skills in academic subject areas through an individually-tailored progress plan, development of competence in taking

increased self-responsibility for learning and managing his or her own behavior and environment, and fostering of a sense of social and cognitive competence and self-esteem.

Students in ALEM classrooms are expected to acquire academic skills while gaining confidence in their abilities to learn and to cope with the social and intellectual demands of schooling. To these ends, the program developers have designed and evaluated alternative practices and program implementation support systems. Figure 1 shows a model for the design and evaluation of the ALEM. As suggested by the model, program design work begins with the identification of instructional goals and student characteristics. This information constitutes basic input in the design of specific program dimensions related to the ongoing provision of adaptive instruction in classroom settings, as well as the provision of classroom-level and school- and district-level supports for program implementation. The design and development of program dimensions are followed by implementation of the program in school settings and evaluation of related outcomes.

Note the model's inclusion of both product and process variables as indicators of program outcomes. Product outcomes are defined as the competence and attitudes acquired by students. These results are determined at specific terminal points in exposure to the program. Examples of product outcomes include achievement in basic skills and development of perceptions of self-competence and personal control. Process outcomes, on the other hand, refer to changes in the instructional-learning process (e.g., student-teacher interactions, the manner in which learning occurs). While they are considered

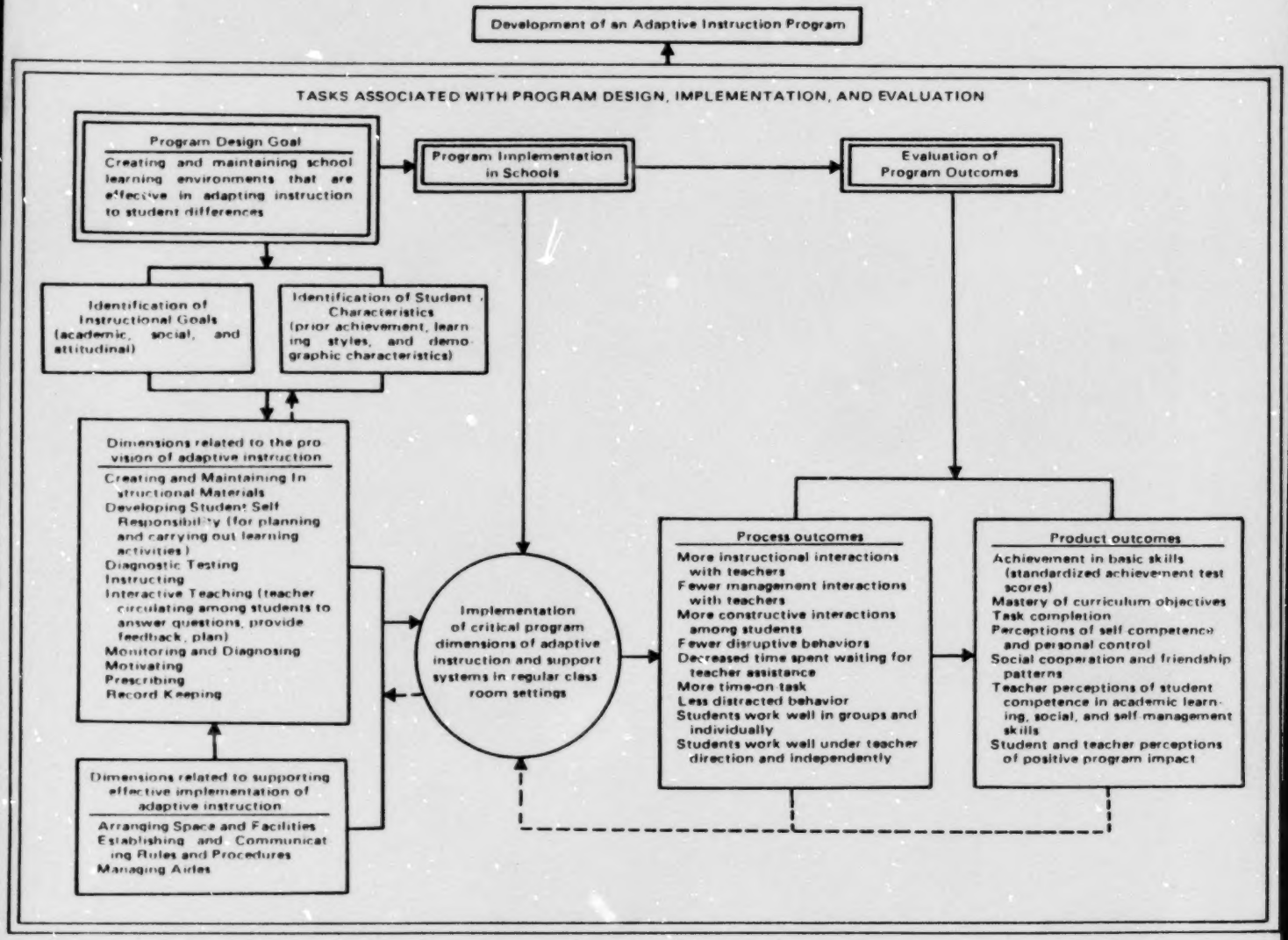
Development of an Adaptive Instruction Program
TASKS ASSOCIATED WITH PROGRAM DESIGN, IMPLEMENTATION, AND EVALUATION
Program Design Goal
Creating and maintaining school learning environments that are effective in adapting instruction to student differences
Program Implementation in Schools
Evaluation of Program Outcomes
Identification of Instructional Goals (academic, social, and attitudinal)
Identification of Student Characteristics (prior achievement, learning styles, and demographic characteristics)
Dimensions related to the provision of adaptive instruction
Creating and Maintaining Instructional Materials
Developing Student Self Responsibility (for planning and carrying out learning activities)
Diagnostic Testing
Instructing
Interactive Teaching (teacher circulating among students to answer questions, provide feedback, plan)
Monitoring and Diagnosing
Motivating
Prescribing
Record Keeping
Dimensions related to supporting effective implementation of adaptive instruction
Arranging Space and Facilities
Establishing and Communicating Rules and Procedures
Managing Aides
Implementation of critical program dimensions of adaptive instruction and support systems in regular class room settings
Process outcomes
More instructional interactions with teachers
Fewer management interactions with teachers
More constructive interactions among students
Fewer disruptive behaviors
Decreased time spent waiting for teacher assistance
More time-on task
Less distracted behavior
Students work well in groups and individually
Students work well under teacher direction and independently
Product outcomes
Achievement in basic skills (standardized achievement test scores)
Mastery of curriculum objectives
Task completion
Perceptions of self competence and personal control
Social cooperation and friendship patterns
Teacher perceptions of student competence in academic learning, social, and self management skills
Student and teacher perceptions of positive program impact

Figure 1. A model for the design, implementation, and evaluation of the Adaptive Learning Environments Model.

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to be valuable outcomes in their own right as effective classroom behaviors, process outcomes also are viewed as critical mediating variables which enhance students' capabilities to effectively function under, and profit from, the program.

This conceptualization of process outcomes as both independent and dependent variables also reflects the particular definition of adaptive instruction that provides the framework for the ALEM's design. According to this definition, adaptive instruction refers to modification of the instructional program (e.g., the instructional process, teacher behaviors) to accommodate student differences, combined with the use of specific interventions to modify the ability of each student to profit from the program's educational provisions. For a fuller discussion of the ALEM's design and supporting research, see Wang (1980a); Wang and Birch (1984); and Wang, Gennari, and Waxman (in press).

THE STUDY

Taking into consideration the principles underlying the design of the ALEM, the present study specifically addressed the following hypotheses regarding program implementation and effects.

1. The degree of implementation will increase over time and by the end of the school year, all of the ALEM classes in each of the participating schools (located in three community school districts with different ethno-cultural and SES characteristics) will attain

a high degree of implementation (scores of 85% or greater on the implementation measures) in all 12 critical program dimensions.

2. Improvements in program implementation will lead to changes in classroom processes for both the general education students and the mainstreamed special education students. The frequencies of some process outcomes will increase (e.g., student-initiated interactions with teachers), while the frequencies of others will decrease (e.g., time spent waiting for teacher help). Furthermore, no significant differences in the classroom processes for general and special education students will be observed.

3. Qualitative changes in classroom processes will lead to certain positive outcomes for both general education and special education students. These outcomes include expected levels of math and reading achievement; a sense of control over the processes and outcomes of school learning; and positive attitudes toward, and evaluations of, the school environment. Positive attitudes toward, and assessments of, the ALEM's efficacy by teachers and parents will result.

Setting

The study was carried out during the 1982-83 school year in 26 mainstreaming classrooms in five public schools located in a large urban

school system. As noted, the schools are part of three community districts that differ in size and in ethno-cultural and SES characteristics. Table 1 provides a summary of background information on the districts, which were included in the study as a result of their voluntary participation in a project designed to test the implementation and effects of the ALEM as a full-time approach to mainstreaming exceptional students.

Two criteria were considered in selection of districts for the project. These were the level of interest expressed by district superintendents and administrators, and the need to include in the project's sample population students with varying SES and ethnocultural backgrounds. The final selection of schools for participation in the project was determined collaboratively by the district superintendents, the school principals and their faculties, and the senior author.

Subjects

Subjects for the study included students and teachers from all of the mainstreaming classes in the participating schools where the ALEM was implemented as the core program.

Students. Enrollment in each of the participating classes ranged from 16 to 33 general education and mainstreamed special education students (including educable mentally retarded [EMR]; learning disabled [LD]; and socially and emotionally disturbed [SED] classifications). As shown in Table 1, the student populations in the participating districts/schools varied in

Table 1

Background Information on
Participating Districts and Schools

District	District Characteristics									Participating Schools				
	Student Enrollment	Title I - Eligible Students	Students in the Free or Reduced Lunch Program	Racial/Ethnic Composition of Student Population						Number of Schools	Number of ALEM Classrooms at Each Grade Level			
				Caucasian	Black	Hispanic	Asian	Native American	Other		1	2	3	4
A	21,500	19%	50%	75%	15%	8%	2%	–	–	2	3	4	5	2
B	24,000	12%	60%	55%	5%	30%	10%	–	–	1	2	2	2	–
C	16,734	70%	70%	15%	55%	25%	2%	1%	2%	2	2	2	2	–

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racial/ethnic composition. The average number of special education students in each class was 5 (approximately 15%). The classes generally were staffed by one teacher and one half-time aide per class, with an average student-adult ratio of 17 to 1.

Teachers. Of the 26 teachers participating in the study, 24 were female and 2 were male. The average teaching experience was 17 years (a range of 2 to 32 years) and 10 years in currently assigned buildings. Six of the teachers volunteered to participate in the study, and 17 were selected by their respective administrations. Although all of the teachers were given the choice of not participating, none opted out of the study. Nineteen of the teachers held master's degrees and five held bachelor's degrees. (In cases where the total numbers of teachers do not add up to 26, missing data are indicated.)

Measures

Four types of measures provided the data base for the present study. They are measures of the degree of program implementation, classroom process outcomes, student academic and attitudinal outcomes, and teacher and parent attitudes and assessments. The implementation and classroom process measures were administered three times (fall, winter, spring) during the 1982-83 academic year. The measures of student achievement and attitudinal outcomes, and the measures of teacher and parent attitudes, were administered only in the spring. The following are brief descriptions of the measures.

Degree of implementation. As has been noted, a major premise underlying the design of the ALEM is that the implementation and maintenance of certain program dimensions (see Figure 1) are strongly related to desired changes in classroom processes and in students' academic achievement, attitudes, and sense of self-responsibility. Thus, periodic and regular assessment of the degree of implementation is viewed as integral to effective program monitoring and evaluation. The Implementation Assessment Battery for Adaptive Instruction (Wang, 1980b) was used to obtain implementation data for the present study. The Battery consists of six instruments designed to obtain information on the behaviors of students and teachers as they function under the ALEM, the presence or absence of specific features in the classroom environment, and the understanding and perceptions of teachers and students regarding program operation.

The reliability and validity of the Implementation Assessment Battery for Adaptive Instruction are suggested by results from an empirical validation study (Strom & Wang, 1982). The generalizability coefficient for the total mean degree of implementation score for the 12 critical program dimensions of the ALEM was .88. The generalizability coefficients for the individual dimensions ranged from a low of .50 (Record Keeping) to a high of .91 (Interactive Teaching). For the present study, the education specialist (e.g., curriculum supervisor, team leader) in each participating school was trained during three half-day sessions to administer the Battery. The criterion for mastery at the end of training was an inter-rater reliability score of .85+. The training required three half-day sessions. The total time required to administer the six instruments in the Battery was approximately three hours per classroom.

Classroom process outcomes. Data on the desired changes in classroom processes were obtained using the Student Behavior Observation Schedule (Wang, 1974), an observation instrument designed to provide information on the ongoing classroom activities and behaviors of students and teachers. The Student Behavior Observation Schedule (SBOS) has been utilized in a number of investigations of classroom processes under the ALEM, and its inter-observer agreement consistently has been found to be above 85% (Wang, 1976). Classroom process measures have been used as both dependent and independent variables in these studies.

One trained observer was assigned to administer the SBOS in each classroom participating in the study. Observers were given lists that included all of the mainstreamed special education students in each class and an equal number of randomly selected general education students. Students were observed in pre-scheduled, alphabetical order; each student was observed for five, one-minute intervals.

Student achievement and attitudinal outcomes. Assessment of students' academic achievement was based on scores from the Stanford Diagnostic Mathematics Test and the California Achievement Test in reading. These tests are administered annually in the school districts to students in the second grade and beyond.

Two sets of measures — the Intellectual Achievement Responsibility scale (Crandall, 1978; Crandall, Katkovsky, & Crandall, 1965); and the My Class Inventory (Fraser, Anderson, & Walberg, 1982) — were used to assess student attitudes. The Intellectual Achievement Responsibility scale (IAR) is aimed at measuring students' perceptions of locus of control in intellectual-academic situations. The My Class Inventory (MCI) is designed to assess students' perceptions of their classroom climate. Both the IAR and the MCI were administered during regularly scheduled class periods using standardized procedures. Instructions were tape-recorded and the instruments were administered to students by trained observers.

Teacher and parent attitudes. In addition to the collection of information on student attitudes, two measures were used to obtain data on the attitudes and assessments of teachers and parents regarding the operation and effectiveness of the ALEM in the participating classrooms. Teacher attitudes were measured using the Teacher Attitudes and Assessment Survey (Waxman, Wang, Lindvall, & Anderson, 1983). This 66-item, Likert-type instrument is designed to assess teachers' perceptions of individualized instruction and teachers' and students' control of the educational process, the structural and organizational characteristics of the ALEM, the implementation of adaptive instruction, and program outcomes. Similarly, the Parent Survey, which is a 13-item, Likert-type scale, was constructed to assess parents' perceptions of the ALEM in their schools (Strom, Gennari, & Wang, 1982). Building principals disseminated and collected the teacher and parent attitude surveys. The Parent Survey was taken home and returned to school by the students. Of the total number of parents who received the Survey, 253 responded — an overall response rate of 34.1%.

RESULTS

Results from the study are reported in this section under four major headings. Each addresses one of the hypotheses that the study was designed to test.

Program Implementability

It was predicted that the degree of implementation of the ALEM would increase over time and that a high degree of program implementation (85% or better) would be attained in all schools. Despite demographic differences, no significant differences in implementation were expected among the collaborating schools. Results of the degree of implementation assessments for each of the 12 program dimensions across all three data collection periods (fall, winter, spring) are summarized in Figure 2. As shown in the figure, there were incremental increases in degree of implementation scores in all dimensions for all three periods. Furthermore, the mean scores for all dimensions in spring were above the 85% criterion.

To further test the hypothesis of improved implementation over time, a correlation analysis was performed on the time of data collection (fall, winter, spring) and the degree of implementation scores for each of the 12 critical dimensions. The slope over time for each dimension was tested against the null hypothesis (a slope of 0 from fall to spring). The results showed that 11 of the 12 correlations were significantly and positively different than zero (ranging from .20 to .69); nine were at the .001 level of

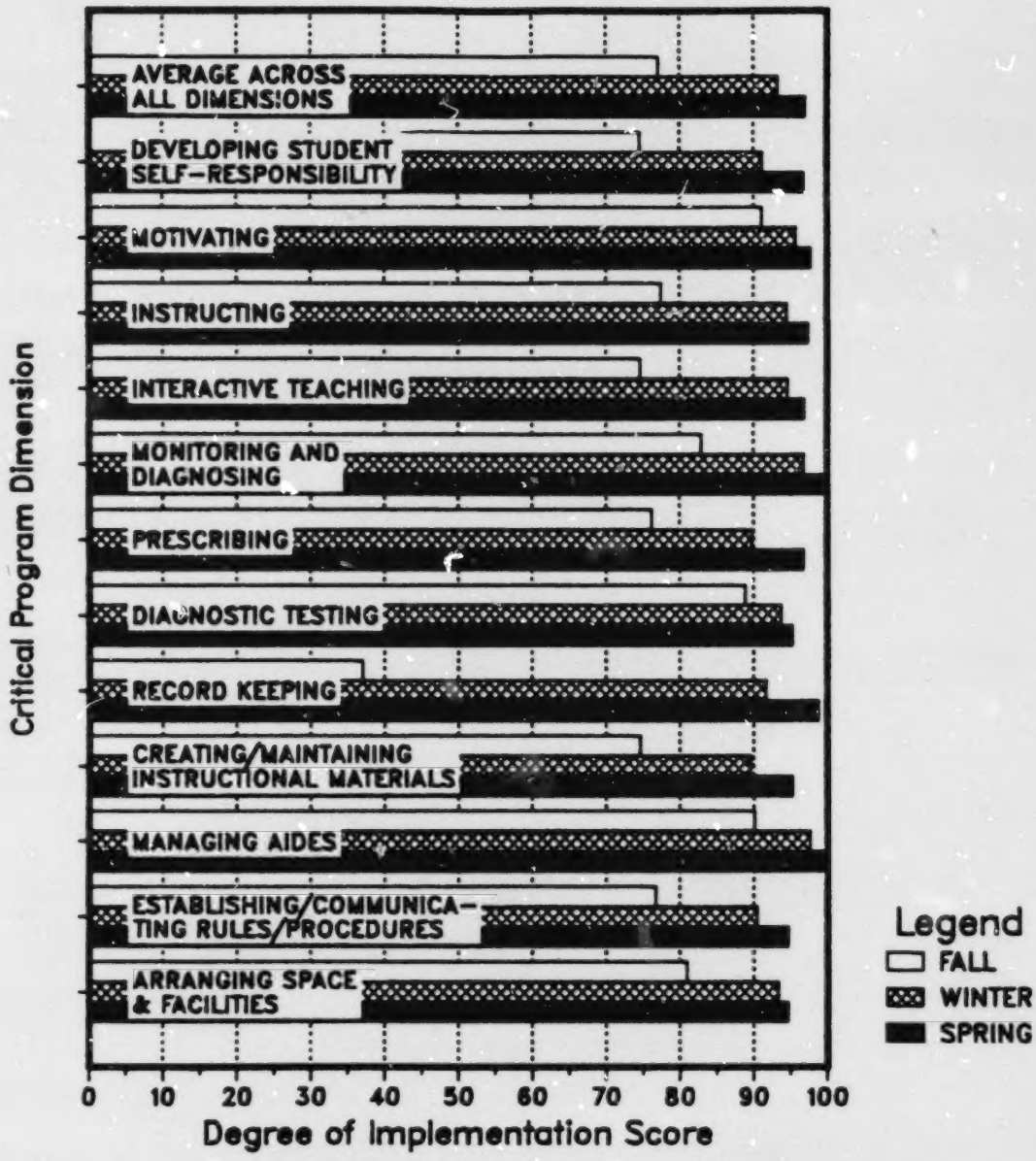

Figure 2. Summary of mean degree of implementation scores across the 28 classrooms for fall, winter, and spring (1982–83 school year).

probability. In only one case -- Diagnostic Testing -- were the increases in degree of implementation scores found to be nonsignificant. It should be noted, however, as shown in Figure 2, that the degree of implementation of this dimension did increase over time. The small increase in the score essentially reflects a ceiling effect: The implementation score for Diagnostic Testing already was beyond the 85% criterion level in the fall.

It was predicted that there would be little differences among schools in the degree of implementation, despite differences in a number of school characteristics (see Table 1). All schools were hypothesized to be able to attain degree of implementation scores of 85% or greater by spring. This hypothesis was supported. As shown in Table 2, all schools had mean degree of implementation scores of at least 94% in the spring. A regression analysis of the differences among schools (spring implementation only) was not found to be statistically significant.

The implementation data also were analyzed to determine the percentages of teachers who had reached the high degree of implementation criterion (scores of 85% or above) in all dimensions and the mean numbers of dimensions with criterion-level scores in each school. High degrees of implementation were reflected in all the data examined. As shown in Table 2, the percentages of teachers across the five schools who had reached the criterion in all dimensions by spring, as well as the mean numbers of dimensions with criterion-level scores in each school, were found to be consistently high. The one exception was School 5, where the percentage of teachers with scores at criterion was rather low. While this finding appears anomalous at first

Table 2

Summary of Mean Degree of Implementation by School Year
(1982 - 83 School Year)

School	Mean Percentage of Implementation Scores across All Dimensions			Percentage of Teachers Meeting the 85% Criterion on All Dimensions			Mean Number of Dimensions with Scores at or above 85%		
	Fall	Winter	Spring	Fall	Winter	Spring	Fall	Winter	Spring
1	69.78 (4)*	87.63 (4)	96.10 (4)	0	25.00	98.33	3.50	8.25	10.50
2	85.32 (7)	92.88 (8)	98.49 (6)	0	37.50	100.00	7.29	10.38	12.00
3	77.86 (4)	90.52 (4)	94.15 (4)	0	0	75.00	5.75	9.50	10.75
4	75.76 (6)	99.49 (6)	100.00 (6)	0	83.33	100.00	5.00	11.83	12.00
5	73.37 (6)	93.10 (6)	94.87 (6)	0	16.67	33.33	5.00	10.33	10.33
Mean Across Schools	63.08	92.72	96.72	0	32.50	81.33	5.31	10.06	11.12

Note. *Numbers in parentheses represent the numbers of classes (teachers) on which the means are based.

glance, further examination of the data suggests that the teachers in School 5 actually did achieve a high degree of implementation (e.g., see the mean number of dimensions with scores at or above 85%). The greater variability in the particular dimensions for which teachers from this school scored below the criterion of 85% resulted in the overall low percentage (33%) of teachers with scores at or above 85% in all dimensions.

Relationship between Degree of Program Implementation and Classroom Processes

Increases in the degree of implementation were predicted to be related to qualitative changes in classroom processes. Results from the analyses designed to test this prediction are summarized in Table 3. The table includes a summary of the mean percentages of observed frequencies of the various classroom process variables included in the SBOS for all students (general education and special education) for each data collection period (fall, winter, spring); the hypothesized direction of changes in classroom processes; and the results of the analyses testing the hypothesis related to changes in classroom processes and degree of implementation.

The first analysis was designed to investigate whether the classroom process variables changed in the hypothesized direction. The slope of the actual changes in classroom processes was tested against the null hypothesis of no linear change in slope (i.e., a slope of 0) over the three data collection periods. The correlations are reported in the fifth column of results in Table 3. As shown in the table, significant changes in the predicted directions were found for most of the classroom process variables,

Table 3

Classroom Process Means for the Fall, Winter, and Spring Data Collection Rounds and Correlations with Time (Round) of Data Collection and Total Implementation Score (N=465 Students)

Classroom Process Variable	Data Collection Round			Hypothesized Trend	Correlation with Round[a]	Correlation with Implementation
	Fall	Winter	Spring			
Interactions						
Interactions Between Teachers and Students						
Initiation						
Student	.45	.40	.38	+	.00	.02
Teacher	.52	.53	.61	+	.21***	.08*
Purpose						
Instructional	.70	.86	.93	+	.27***	.16***
Management	.28	.13	.07	-	-.12**	-.20***
Purpose of Interactions With Peers						
Constructive	.26	.26	.28	+	.04	-.01
Disruptive	.02	.02	.01	-	-.02	-.02
Activity Types						
Prescriptive	.54	.81	.79	+	.30***	.36***
Exploratory	.28	.18	.17	+	-.13**	-.21***
Setting						
Group Interactive	.13	.28	.18	+	.06	.01
Group Parallel	.25	.44	.59	+	.37***	.20***
Individual	.62	.28	.24	-	-.41***	-.22***
Initiation						
Assigned	.73	.13	.26	-	-.44***	-.62***
Self-Initiated	.25	.87	.74	+	.46***	.62***
Manner						
On-Task	.75	.82	.82	+	.12**	.05
Waiting for Teacher	.08	.05	.03	-	-.19***	-.13***
Distracted	.16	.14	.15	-	-.06	.02

Note [a]For the purposes of this analysis, classroom process scores were correlated with numbers corresponding to the round during which the data were collected: Fall=1, Winter=2, and Spring=3.

*$p < .05$

**$p < .01$

***$p < .001$

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and most were at the .001 level of probability. For example, interactions between students and teachers for instructional purposes increased significantly ($p < .001$), as hypothesized, and the time spent waiting for teacher help decreased significantly ($p < .001$). Nonsignificant changes were noted for five of the classroom process variables (e.g., student-initiated interactions with teachers). Only one of the variables -- frequency of work on exploratory activities -- showed a change that was contrary to prediction: It was hypothesized that this variable would increase significantly over time.

The same type of correlational analysis was carried out to test the hypothesized relationship between changes in classroom processes and the overall degree of implementation score across all participating classrooms over the three data collection periods. The data basically suggest that there was a significant relationship between changes in degree of implementation and changes in classroom processes. One major nonsignificant correlation was for the on-task variable. Although the correlation, as hypothesized, was in the positive direction, its relationship to the degree of implementation was not found to be significant.

Relationship between Implementation and Selected Student Outcomes

The study's third hypothesis predicted positive relationships between program implementation and changes in classroom processes and student achievement, student and teacher behaviors, and attitudinal outcomes for both general education and special education students. Specifically, the data were analyzed to examine (a) the impact of the ALEM on student achievement in

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reading and math; (b) the relationship between the degree of implementation of critical program features and student learning outcomes; and (c) the differences, if any, between classroom processes and outcomes for general education and special education students.

Impact of the ALEM on student achievement. Two separate sets of analysis were carried out to examine the impact of the ALEM on student achievement. The first focused on comparisons of students' actual gain scores in math and reading with expected achievement gains based on national and population norms. The second set of analysis was aimed at comparing achievement data from selected ALEM classes and a non-ALEM class that served as a comparison group for the study.

1. Achievement gains for the ALEM students. The basic question in this set of analysis was whether both the general education students and the special education students in the ALEM classrooms made expected, or greater, achievement gains. The average gains for both groups of students were found to be at or above the expected one-year gain in grade equivalent. The mean gains for general education students were 1.87 in math (which is significantly different from the expected gain of 1.00, $p < .001$) and 1.19 in reading, $p < .01$).

The achievement gains for the mainstreamed special education students in the ALEM classrooms were 1.08 in math and 1.04 in reading. These achievement gain scores for the special education students were not found to be significantly beyond the national norm -- a gain of one-year grade equivalent.

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However, they were significantly greater than the expected gains in both reading ($t = 2.62$, $p < .01$) and math ($t = 2.62$, $p < .01$) for students with comparable special education classifications. The average achievement gain for students in the three school districts with similar special education classifications was six months.

In addition, the program's impact on student achievement in reading and math was suggested by mean percentile rankings that were significantly above the national norm. The mean percentile ranks in reading for the general education students were 60.7 for the second grade, 65.0 for the third grade, and 66.1 for the fourth grade. The mean percentile rank scores for these students in math were 71.0 for the second grade, 75.7 for the third grade, and 66.1 for the fourth grade. It is particularly noteworthy that considerable percentages of the special education students had achievement scores that fell at or above the 75th percentile. For example, 42.3% of the fourth-grade, special education students had math scores ranked in the upper quartile, and 28.6% had reading scores at or above the 75th percentile. Further evidence of the program's impact is found in the fact that approximately 30% of the mainstreamed special education students participating in the study were recommended by their teachers as potential candidates for decertification. The average decertification rate in the school districts for special education students with similar classifications who were placed in self-contained, special education classes was 2.8%.

2. Comparison of achievement results for ALEM and non-ALEM students. Since the present study was designed as a feasibility study of the

implementation of the ALEM as a mainstreaming program for moderately handicapped students in a particular urban school system, and because of the difficulty involved in securing a group of control classes for comparison purposes, systematic comparison of ALEM and non-ALEM students was not a major consideration in the study's design. Empirical investigations of the efficacy of the ALEM as a mainstreaming program have been carried out in previous studies (e.g., Wang, in press). Nevertheless, opportunities for performing comparison analyses were pursued in the present study whenever possible.

A comparative analysis of the achievement gains for ALEM and non-ALEM third-grade classes (two ALEM classes and one non-ALEM class) in one of the participating schools was performed. These classes represented all the third-grade classes in that particular school and their comparability was suggested by the statistically nonsignificant differences in the pretest scores for general education students in the ALEM and non-ALEM classes. It should be noted, however, that despite comparable achievement scores for the general education students, there was a major difference between the two sets of classes. Fifteen percent of the students in the two ALEM classes were special education students mainstreamed from self-contained, special education classes. No special education students were included in the one non-ALEM class.

To test for program impact on student achievement, linear regression analyses were performed using the gain scores in reading and math for both groups of students. The first comparison was of the scores for only the general education students from the ALEM and non-ALEM classes. The scores for

special education students in the ALEM classes were included in the second comparison of the two groups. (Since no mainstreamed special education students were included in the comparison class, direct comparisons of achievement gains for mainstreamed special education students in ALEM classes with achievement results for special education students in other mainstreaming settings were not possible.)

Results from the first comparison showed significant differences between the ALEM and non-ALEM general education students in math, but not in reading. The math gains for the ALEM general education students were significantly greater than the math gains for the non-ALEM group (R^2= .16, F [1,50] = 9.40, $p < .01$). Inclusion of the achievement gain scores for the special education students in the ALEM group for the second linear regression analysis did not alter this general finding. That is, the mean gains of ALEM students (including scores in math for both the general and special education students) were significantly greater than the math gains of the non-ALEM, general education students (R^2= .08, F [1,57] = $p < .03$). No significant difference was found in the reading gain scores for the two groups of classes.

It is also noteworthy that the average gains in grade equivalent for the ALEM students (general and special education students combined) in reading and math were about twice as great as the grade equivalent gains for students in the comparison class (reading -- .75 for ALEM students vs. .33 for students in the comparison class; math -- 2.3 vs. 1.3). This finding suggests that the small sample size might be a major reason for the nonsignificant results in reading. Similarly, the problem of sample size precludes any significant

extrapolations from the results of these comparison analyses of the achievement gains between the ALEM and the non-ALEM students. Thus, the data as presented can be viewed, at best, as an indication of a possible trend.

Relationship between implementation and student learning outcomes. To investigate the relationships between the degree of program implementation and student outcomes, linear regression analyses first were used to test the hypothesized positive relationships between program implementation (total score) and student achievement gains in reading and math, and between implementation and student attitudes. The relationships between each critical dimension and the outcome measures were further examined using Pearson product-moment correlations. The results are reported in Table 4.

1. Implementation and achievement. A statistically significant relationship between overall implementation scores and math achievement was noted ($p < .01$). Although a similar relationship was not found for reading, results from linear regression analyses suggest that in the cases of both reading and math, the implementation scores accounted for a significant proportion of the variance in achievement gains ($R^2$for reading = .16, F = 4.19, $p < .01$; $R^2$for math = .45, F = 16.67, $p < .001$).

In addition, results from analysis of the patterns of correlation between degree of implementation scores and student achievement gains in math and reading suggest some consistently positive relationships (see Table 4). For example, three of the ALEM's critical dimensions -- Managing Aides, Diagnostic Testing, and Monitoring and Diagnosing -- were found to be significantly

Table 4

Results from Correlation Analyses of Degree of Implementation Scores, Reading and Math Achievement Gain Scores, and Attitudinal Outcomes (as measured by the Intellectual Achievement Responsibility Scale (IAR) and the My Class Inventory (MCI))

		Achievement Gains		IAR			MCI				
				Sub Scales							
Critical Dimension	Mean Degree of Implementation Score (Total Score)	Reading (N = 308)	Math (N = 253)	Responsibility for Positive Outcomes (N = 391)	Responsibility for Negative Outcomes (N = 393)	Total Score (N = 389)	Cohesiveness (N = 409)	Friction (N = 412)	Difficulty (N = 410)	Satisfaction (N = 412)	Competence (N = 409)
Arranging Space & Facilities	89.63	.00	.30***	.01	.02	.02	−.03	−.06	.08	.04	−.06
Creating/Maintaining Instructional Materials	86.42	.04	.20***	.06	.00	.03	.02	−.12**	.02	.09*	−.02
Establishing/Communicating Rules & Procedures	87.24	.02	−.01	.07	.00	.04	.02	−.03	.00	.04	.00
Managing Aides	95.88	.12*	.41***	.13**	.20***	.23***	.00	.01	.13**	−.04	−.02
Diagnostic Testing	92.59	.18***	.18**	.10*	.12**	.13***	−.11**	.19***	.12**	−.13**	.08*
Record Keeping	75.72	.05	.12*	−.07	−.14**	−.13**	.19***	−.08	−.11*	.16***	.01
Monitoring & Diagnosing	93.21	.14*	.15**	.05	.05	.06	−.08	.07	.18***	.18***	.00
Prescribing	87.48	−.10*	−.16**	−.01	−.03	−.02	.07	−.06	−.09	.00	−.04
Interactive Teaching	83.68	−.08	−.05	.12**	.12**	.15***	.04	−.06	.04	.02	−.03
Instructing	89.74	−.08	−.31***	.12**	.13**	.15***	−.12**	.09	.03	−.14**	.00
Motivating	94.82	.03	.21***	.06	.11*	.11*	−.03	.07	.10*	.08	−.03
Developing Student Self Responsibility	87.46	.03	−.01	.07	.02	.05	.08	−.04	−.02	.10*	.00
Total Scores	89.07	.05	.16**	.10*	.08	.11*	.02	−.03	.06	.01	−.02

Note * $p < .05$
** $p < .01$
*** $p < .001$

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related to gains in both math and reading. A greater number of significant correlations was found, however, between implementation of the ALEM's critical program dimensions and math achievement. Significant correlations between implementation and math achievement were found for all but three dimensions.

The differences in the number of significant correlations between program dimensions and scores in reading and math, particularly the negative correlations, are noteworthy from a program refinement perspective. They point to the need to further examine curriculum-specific, implementation requirements and to conduct further functional analysis of the critical dimensions. One example of such studies would be analysis of the extent to which certain critical dimensions included in the design of the ALEM might facilitate learning in reading more so than in math, and vice versa.

2. *Implementation and attitudinal outcomes.* To test the hypothesized positive relationship between program implementation and student attitudes, results from correlational analyses between degree of implementation scores and students' scores on the IAR and the MCI were examined.

The results reported in Table 4 suggest an overall positive relationship between implementation and IAR scores ($p < .05$). In addition, implementation scores for the 12 critical dimensions predicted significant amounts of variance in the IAR score ($R^2 = .12$, $F = 4.36$, $p < .01$). It is also interesting to note the dimensions for which significant positive correlations with IAR scores were found — Managing Aides, Diagnostic Testing, Interactive Teaching, and Instructing. All of these dimensions, except Managing Aides,

were either directly or indirectly related to teacher assessment and feedback regarding student performance.

The relationship between program implementation and students' perceptions of, and attitudes toward, the classroom environment was examined using the sub-scale scores on the MCI. As shown in Table 4, the results suggest that the overall relationship was not significant. Among the critical dimensions that showed significant correlations with the MCI sub-scales were Creating and Maintaining Instructional Materials, Diagnostic Testing, Record Keeping, Monitoring and Diagnosing, and Instructing. It should be noted, however, that the variability and small size of the correlations make it difficult to interpret these data.

Comparison of classroom process and outcome measures for general education and special education students. An ultimate goal of adaptive instruction is to increase the chances for all students to experience schooling success, despite individual differences in prior achievement level and related learning characteristics. A basic contention is that, if instructional programs are adaptive to student differences, all students, in spite of varied learning characteristics and needs, should exhibit similar behaviors that have been hypothesized as classroom process outcomes of the ALEM, and the presence of these classroom processes should enable both the general education students and the mainstreamed special education students to make achievement gains that are at or above the expected levels. Thus, one criterion for testing the efficacy of the ALEM as a mainstreaming program is the extent to which expected achievement and attitudinal outcomes were attained by both groups of students in the ALEM classrooms.

Two questions were addressed in the comparison of classroom process measures for the general education and special education students. The first was whether there were significant differences in the classroom processes for the two groups. The second question was whether any differences in classroom processes over time (between fall and spring of the school year) were a function of students' educational status (i.e., special education or general education). Data from the SBOS were used in a series of multiple linear regression analyses to test the extent of any significant interactions between educational status and time spent under the ALEM. Results from the analysis showed that none of the regression F scores was statistically significant. In other words, differences in SBOS scores over time were not attributable to students' educational classification status (i.e., special or general education).

1. Classroom processes. To further investigate the classroom process patterns, the mean observed frequencies of difference scores for the classroom process variables included in the SBOS were examined. The means, standard deviations, and results from tests of differences for the fall and spring SBOS results for the general education and special education students are reported in Table 5.

Overall, a consistent pattern of those classroom processes hypothesized to be characteristic of the ALEM seem to be reflected in the results for both groups of students. Furthermore, the changes in classroom processes from fall

Table 5

Comparison of the Mean Percentages of Observed Frequencies of Classroom Processes for General Education and Special Education Students

Classroom Process Variables	Fall					Spring				
	General Education Students (N = 139)		Special Education Students (N = 67)		Difference in Mean Scores	General Education Students (N = 178)		Special Education Students (N = 68)		Difference in Mean Scores
	Mean	(S.D.)	Mean	(S.D.)		Mean	(S.D.)	Mean	(S.D.)	
Interactions										
Interactions Between Teachers and Students										
Initiation										
Student	46.2	(4.62)	52.5	(4.10)	6.3*	79.0	(2.21)	76.7	(3.11)	2.3
Teacher	50.2	(4.57)	47.5	(4.10)	2.7	21.0	(2.21)	23.3	(3.11)	2.3
Unknown	3.8	(1.46)	0.0	(0)	3.6	0	(0)	0	(0)	0
Purpose										
Instructional	67.6	(4.17)	69.9	(4.20)	2.3	92.6	(2.19)	90.0	(3.00)	2.6
Management	30.8	(4.10)	25.8	(3.97)	5.0	7.3	(2.14)	10.0	(3.00)	2.7
Unknown	1.6	(1.13)	4.3	(2.06)	2.7	.1	(.22)	0	(0)	.1
Purpose of Interactions With Peers										
Constructive	96.7	(1.18)	91.6	(2.20)	5.1	98.5	(2.51)	91.8	(2.37)	6.7*
Disruptive	3.3	(1.18)	8.4	(2.20)	5.1	1.5	(2.51)	8.2	(2.37)	6.7*
Activity Types										
Prescriptive	53.7	(3.25)	58.1	(2.89)	4.4	75.8	(3.28)	79.7	(3.14)	3.9
Exploratory	26.5	(2.98)	26.7	(2.63)	.2	18.8	(3.11)	16.1	(3.06)	2.7
Other	19.8	(1.77)	15.2	(1.75)	4.6	3.6	(1.26)	3.2	(1.28)	.4
Setting										
Group Interactive	12.2	(1.93)	13.5	(2.46)	1.3	16.4	(2.56)	15.6	(2.67)	.8
Group Parallel	24.6	(2.56)	21.1	(2.83)	3.5	59.3	(3.69)	61.0	(3.62)	1.7
Individual	63.2	(3.11)	65.4	(3.55)	2.2	24.3	(3.32)	22.4	(3.11)	1.9
Initiation										
Assigned	70.9	(3.75)	69.7	(3.67)	1.2	24.7	(3.55)	23.4	(3.68)	1.3
Self-Initiated	27.8	(3.70)	26.1	(3.64)	1.5	73.9	(3.55)	75.6	(3.71)	1.7
Cannot Determine	1.5	(.38)	4.2	(.92)	2.7	1.4	(.66)	1.0	(.20)	.4
Manner										
On-Task	76.2	(2.04)	73.3	(2.27)	2.9	8.18	(2.24)	79.0	(2.78)	2.8
Waiting for Teacher Help	8.7	(1.19)	8.5	(1.19)	.2	8.7	(3.66)	7.7	(2.46)	1.0
Distracted	15.1	(1.63)	18.2	(2.06)	3.1	9.5	(2.01)	13.3	(2.22)	3.8

Note. * Indicates statistically significant t-test results, $p \leq .05$.

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to spring were in the hypothesized directions for general education students and special education students alike. For example, the interactions between teachers and students in fall and spring consistently were observed to occur more frequently for instructional, rather than management, purposes. Moreover, the results suggest similar patterns of increases from fall to spring in the instructional interactions between teachers and general education and special education students. As suggested by the regression analysis results, neither the differences in mean SBOS scores nor the differences in the changes in scores from fall to spring for the general education students and the special education students were found to be statistically significant. Significant differences between the two groups of students occurred in only three cases. They were (a) the comparison of fall scores for student-initiated interactions with teachers (significantly greater frequencies of such interactions observed for the special education students); (b) the comparison of spring scores for constructive peer interactions (greater frequencies observed for the general education students); and (c) the comparison of spring scores for disruptive peer interactions (greater frequencies observed for the special education students).

It should be pointed out that, although constructive peer interactions in the spring were observed to be considerably less frequent for the ALEM special education students than for their general education peers, the overall frequency of constructive peer interactions (91.8%) for the mainstreamed students certainly is impressive. Similarly, the 8.2% observed frequency of disruptive behavior on the part of the ALEM special education students seems quite low compared to statistics cited in the literature for either special

education students or general education students in conventional classrooms. These findings are particularly striking in light of the widely-shared concern over the behavioral adjustment and social acceptance of special education students in mainstreaming classrooms.

2. *Achievement in math and reading.* Results from comparisons of the mean reading and math achievement gains for general education and special education students in the ALEM classrooms (for whom spring scores for both 1982 and 1983 were available) are reported in Table 6. The results show that both groups had gain scores that were more than the expected, one-year, grade equivalent. Although the general education students made significantly greater gains in math, compared to the mean scores for the special education students (F [1,246] = 12.68, $p < .001$), the differences in reading gain scores for the two groups were not statistically significant.

3. *Student attitudes.* Scores on the IAR and the MCI were used to analyze the differences, if any, between the attitudinal outcomes for general education and special education students. Table 7 provides a summary of the results from linear regression analyses of the differences in IAR scores. As shown in the table, no significant differences were found in the sub-scales on students' perceptions of self-responsibility for either positive or negative academic events, or in the total IAR scores. Major differences between the two groups of students were noted, however, in three of the five sub-scales of the MCI (see Table 8). These sub-scales are Competitiveness (F [1,396] = 12.34, $p < .001$); Difficulty (F [1,396] = 6.97, $p < .01$); and Cohesiveness (F [1,396] = 15.03, $p < .001$). Compared to their general education peers, the

Table 6

Comparison of Grade Equivalent Achievement Scores
for the General Education and Special Education Students

	General Education Students	Special Education Students	Regression F^a
Reading Gains:			
Mean	1.19	1.04	.50
(*SD*)	(1.04)	(.73)	
t^b	3.03**	.33	
(*N*)	(263)	(45)	
Math Gains:			
Mean	1.87	1.08	12.68***
(*SD*)	(1.42)	(1.17)	
t^b	8.98***	.45	
(*N*)	(213)	(40)	

Note. [a]Used to test differences between mean gains for general education and special education students.

[b]Used to test hypothesis that the mean achievement gains were greater than a one-year grade equivalent (the expected population mean for achievement gain).

**$p < .01$

***$p < .001$

Table 7

Comparison of Intellectual Achievement Responsibility Scale (IAR)
Scores for General Education and Mainstreamed Special Education Students

	General Education Students (N=344)		Mainstreamed Special Education Students (N=52)		Regression
Sub-scale	Mean[a]	(SD)	Mean[a]	(SD)	F
Positive Events	.82	(.12)	.80	(.11)	.91
Negative Events	.64	(.18)	.66	(.15)	.48
Total	.73	(.12)	.73	(.10)	.00

Note. [a]Internal response=1; External response=0

Table 8

Comparison of My Class Inventory (MCI) Scores
for General Education and Mainstreamed Special Education Students

	General Education Students (N=365)		Mainstreamed Special Education Students (N=53)		Regression
Sub-scale	Mean[a]	(SD)	Mean[a]	(SD)	F
Satisfaction (27)[a]	17.22	(5.03)	16.23	(3.94)	1.43
Friction (24)[a]	12.28	(3.77)	13.45	(3.96)	3.21
Competitiveness (21)[a]	9.49	(2.29)	10.69	(3.00)	12.34***
Difficulty (24)[a]	17.00	(3.55)	15.62	(2.42)	6.97**
Cohesiveness (18)[a]	11.77	(2.87)	10.12	(2.76)	15.03***

Note. [a]Maximum score for the sub-scale.
**$p < .01$
***$p < .001$

mainstreamed special education students seemed to perceive their classroom environment to be more competitive and less cohesive. *At the same time, they* perceived their academic work to be less difficult, compared to the perceptions of the general education students in this area.

Because of the complexity of the attitudinal constructs and the concerns associated with the measures themselves, the data on student attitudes must be viewed as exploratory. Although some positive trends are suggested (i.e., the finding of no significant differences between special and general education students in terms of their perceptions of self-responsibility for their school learning and other schooling events), the meaning of the findings is not clear. For example, what are the implications of comparably greater perceptions of competitiveness among special education students (than among general education students) for the motivation and learning processes of these mainstreamed special education students? The finding that the special education students perceived their work to be less difficult, compared to the difficulty levels perceived by the general education students, also is ambiguous. On the one hand, it could mean that the teachers paid closer attention to diagnosing the needs of the mainstreamed special education students in prescribing work for them. One result would be that these students would have been given assignments at an appropriate level of difficulty. On the other hand, this finding on students' perceptions of the difficulty of their work also could indicate that the teachers had low expectations for the academic performance of the special education students and, therefore, they deliberately assigned work at lower difficulty levels, compared to the difficulty levels of work assigned to the general education

students. Thus, it is obvious that more detailed data on classroom processes and student perceptions in this area are needed to answer these and related questions regarding the effects of mainstreaming on student attitudes.

Teacher and Parent Attitudes and Assessments of Program Impact

In addition to the analysis of selected student outcome measures, teachers' and parents' assessments of the ALEM's impact were obtained through the Teacher Attitudes and Assessment Survey and the Parent Survey.

Teachers' attitudes toward, and assessments of, the program. The Teacher Attitudes and Assessment Survey was designed to obtain two major categories of information: teachers' perceptions of the ALEM and its impact on teachers, and teachers' perceptions of the program's impact on students. Survey responses for the present study are summarized, according to these two categories, in Tables 9 and 10.

As shown in Table 9, responses to items related to teachers' perceptions of the ALEM and its impact on teachers are organized in three sub-categories: General Assessment of the Program, Provision for Student Differences, and Attitude Toward Individualizing Instruction and Team Work. While some variation was noted in the ratings among items within and across the sub-categories, the totals shown in the last row of Table 9 suggest a quite positive assessment of program impact. The overall mean rating was 3.21 (4.00 being the criterion rating for strongly positive perceptions on any of the items). It is interesting to note that the majority of teachers (74%) agreed

Table 9

Summary of Results from the Teacher Attitudes and Assessment Survey: Teachers' Perceptions of the Program and Its Impact on Teachers

Spring, 1983
(N = 25)

Item	Percentage of Responses: Strongly Agree & Agree	Strongly Disagree & Disagree	No Response	Mean Rating*	(S.D.)
A. General Assessment of the Program					
**1. I would prefer teaching in another type of instructional program.	18.5	74.0	7.4	3.52	(1.76)
**2. Teaching in this program does not allow teachers the opportunity to work together.	3.7	96.3	0	3.37	(.56)
3. I find this instructional program professionally rewarding.	85.1	14.8	0	3.30	(.72)
**4. I do not enjoy teaching in this program.	22.2	77.7	0	3.15	(.87)
5. Teaching in this program is challenging and stimulating.	88.9	11.1	0	3.41	(.69)
Total for the Scale				3.35	(.92)
B. Provision for Student Differences					
1. This program enables teachers to get to know their pupils better.	85.1	14.8	0	3.33	(.73)
2. This program helps teachers to learn how to utilize information for diagnostic planning.	85.2	14.8	0	3.07	(.62)
**3. This program is not very helpful in permitting the teacher to meet each pupil's needs.	3.7	92.5	3.7	3.67	(1.21)
**4. Low achieving students cannot be trusted to play a role in managing their own instruction.	3.7	96.3	0	3.33	(.56)
Total for the Scale				3.35	(.78)
C. Attitude Toward Individualizing Instruction and Team Work					
1. Teachers should give other teachers, aides, and students some responsibility for instructing students.	100.0	0.0	0	3.44	(.51)
2. Teachers do not need to direct all of the activities that occur in the classroom.	88.9	11.1	0	3.07	(.55)
**3. Discipline problems increase when students are given learning options.	7.4	92.6	0	3.15	(.66)
**4. Providing individualized instruction places too heavy a demand on teachers.	33.3	66.7	0	2.63	(.79)
**5. Individualizing instruction requires teachers and/or aides to spend too much time keeping records.	74.0	25.9	0	2.00	(.73)
6. Individualizing instruction is an efficient way to use teacher time.	81.5	14.8	3.7	3.33	(1.30)
Total for the Scale				2.94	(.76)
Overall Total				3.21	(.92)

Note. *Rating Score: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree.
**Because of the negative nature of the wording of these statements, the scoring is reversed: 1 = strongly agree; 2 = agree; 3 = disagree; 4 = strongly disagree.

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Table 10

Summary of Results from the Teacher Attitudes and Assessment Survey:
Teachers' Perceptions of the Program and Its Impact on Students

Spring, 1983
(N = 25)

Item	Percentage of Responses: Strongly Agree & Agree	Strongly Disagree & Disagree	No Response	Mean Rating*	(S.D.)
A. Student Attitudes and Academic Performance					
1. Students feel better about themselves because of this program.	85.1	7.4	7.4	3.78	(1.62)
** 2. This instructional program has no effect on students' attitudes toward school.	3.7	96.3	0	3.52	(.58)
** 3. Student learning suffers when teachers relinquish some of their control of student learning.	11.1	88.8	0	3.30	(.67)
** 4. This instructional program is no more effective in improving student achievement than any other program.	18.5	70.4	11.1	3.59	(2.00)
** 5. Student learning is most effective when the teacher controls all the activities in the classroom.	11.1	88.9	0	3.07	(.55)
6. Providing learning options for students improves their academic performance.	81.5	11.1	7.4	3.56	(1.67)
7. Individualizing instruction results in each student working on a lesson appropriate for his/her current level of achievement.	96.3	3.7	0	3.52	(.58)
Total for the Scale				3.48	(1.10)
B. Classroom Management and Behavior					
1. Students in this classroom know how many assignments to finish each day.	92.5	7.4	0	3.41	(6.40)
2. Students in this classroom get their work done on time.	74.1	22.2	3.7	3.00	(1.33)
3. Students should have some choice in selecting their learning activities.	96.3	3.7	0	3.26	(.53)
4. Students are more engaged and involved in their school work because of this program.	92.6	7.4	0	3.33	(.62)
5. Students in this class take responsibility for their own behavior and learning.	66.7	33.3	0	2.74	(.71)
6. Students in this class use their instructional materials appropriately.	92.6	3.7	3.7	3.37	(1.21)
Total for the Scale				3.18	(.84)
Overall Total				3.33	(.97)

Note. *Rating Score: 1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree.
**Because of the negative nature of the wording of these statements, the scoring is reversed: 1 = strongly agree; 2 = agree; 3 = disagree; 4 = strongly disagree.

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that individualizing instruction requires spending a considerable amount of time on paperwork.

Table 10 provides a summary of teachers' responses to items related to their perceptions of the ALEM's impact on students. As shown in Table 10, responses to these items are grouped in two sub-categories: Student Attitudes and Academic Performance, and Classroom Management and Behavior. As with the results on teachers' assessments of the ALEM's impact on teachers, the responses regarding the ALEM's impact on students were quite positive. For items in the Student Attitudes and Academic Performance sub-category (Category A in Table 10), for example, 96.3% of the teachers disagreed that the ALEM had no effect on students' attitudes toward school (Item 2), and 85.1% agreed that students felt better about themselves because of the program (Item 1). High percentages of agreement (81.5 and 96.3, respectively) also were reported for Item 6 (Providing learning options for students improves their academic performance.) and Item 7 (Individualizing instruction results in each student working on a lesson appropriate for his/her current level of achievement.).

Regarding the teachers' perceptions of the program's impact on classroom management and student behavior (Category B in Table 10), the responses of the majority of the teachers suggest agreement that students in the project's ALEM classes seemed to know what was expected of them (Item 1 -- 92.5%); they tended to complete their work on time (Item 2 -- 74.1%); and they were more engaged and involved in their school work because of the program (Item 4 -- 92.6%).

Parents' attitudes toward, and assessments of, the program. Of the total number of parents who received the Parent Survey, 253 responded -- an overall response rate of 34.1%. It is noteworthy that there was great variation in the response rates among the five participating schools, ranging from a low of 6% to a high of 72%. Table 11 provides a summary of results from the Parent Survey. The data suggest an overall positive appraisal of the ALEM's implementation and effects. This is evidenced by the total mean score shown in the last row of Table 11. The overall mean was 3.98 (maximum possible score of 5.00). The overall mode was 3.69.

While the low rate of return for responses to the Parent Survey is reason to exercise caution in interpreting the results, some patterns in the data do seem to be suggested. For example, there were seven items with responses of greater than 70% in the Strongly Agree and Agree category. Some examples are Item 2 (In general, I know what my child does in school each day.); Item 9 (I am in favor of having the ALEM continue in our school.); and Item 11 (I am pleased with how well my child is doing in school.).

Of the responses in the Strongly Disagree and Disagree category, the greatest response was for Item 10 (My child does not seem to be getting as good an education as I did -- 67.7% disagreed). All other items had relatively low ratings of disagreement. It is interesting to note that a large proportion (one-fourth) of the respondents to the Parent Survey felt there was a need for closer communication with school personnel regarding the ALEM's implementation and their children's education.

Table 11

Summary of Results from the Parent Survey

Spring, 1983

(N = 253)*

Item	Rating **			Percentage of Responses			
	Mean	(S.D.)	Mode	Strongly Agree and Agree	Neutral	Strongly Disagree and Disagree	No Response
1. I wish I had more information about the ALEM.	4.10	(1.03)	5.00	77.9	10.3	9.1	2.8
2. In general, I know what my child does in school each day.	3.96	(.96)	4.00	78.2	11.9	9.1	0.8
3. The people at school make sure that I know as much as possible about the ALEM.	3.46	(1.28)	4.00	55.7	17.4	25.3	1.6
4. Parents should participate in the activities at their children's school.	4.42	(.69)	5.00	52.2	10.3	0.4	1.2
5. I have visited my child's class several times.	4.08	(1.03)	4.00	80.6	7.1	10.7	1.6
6. I usually go to meetings at school (such as parent-teacher conferences, PTA meetings, parent awareness sessions).	3.45	(1.22)	4.00	54.9	19.0	24.5	1.6
7. The ALEM seems to be working in this school.	3.94	(1.00)	5.00	63.6	27.3	5.2	4.0
8. In general, the ALEM seems to have improved this school.	3.70	(.97)	3.00	50.6	39.5	5.2	4.7
9. I am in favor of having the ALEM continue in our school.	4.18	(.97)	5.00	73.5	17.8	4.8	4.0
***10. My child does not seem to be getting as good an education as I did.	3.86	(1.29)	5.00	15.4	14.6	67.7	1.6
11. I am pleased with how well my child is doing in school.	4.05	(1.05)	5.00	78.2	9.9	10.7	1.2
12. My child seems to be doing many interesting things at school.	4.17	(.96)	5.00	80.3	12.6	6.0	1.2
13. In general, the ALEM has been good for my child.	4.11	(.97)	5.00	70.8	20.2	4.8	4.3
Total	3.98	(.58)	3.69	64.0	16.8	14.1	2.4

Note. *This number represents a response rate of 34.1% across the five schools.

**Rating score: 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree.

***Because of the negative wording of this statement, the scoring is reversed: 1 = strongly agree; 2 = agree; 3 = neutral; 4 = disagree; 5 = strongly disagree.

SUMMARY AND DISCUSSION

The primary purpose of this study was to investigate the implementation and effectiveness of the ALEM as a full-time mainstreaming program for moderately handicapped students in a large urban school system. The contention was that, under the ALEM, instructional provisions could be effectively adapted to the needs of most students, including moderately handicapped students with EMR, LD, and SED classifications who were integrated in regular classroom settings on a full-time basis. A high degree of implementation of the ALEM's critical program dimensions was hypothesized to facilitate positive academic and attitudinal outcomes for both general education students and mainstreamed special education students. As pointed out in the earlier discussion of the ALEM's design, the adaptive instruction practices operating in ALEM classes are not new. They have been the hallmark of effective special education practices (Heller, Holtzman, & Messick, 1982). What is unique, however, is the inclusion in the program's design of a systematic implementation delivery system that supports a high degree of implementation of adaptive instruction by general education teachers in regular classroom settings.

Overall, the results from the study provide evidence of the feasibility and efficacy of a full-time mainstreaming approach for the moderately handicapped students who were enrolled in the ALEM classrooms. The data suggest not only that it was possible to establish and maintain implementation of the ALEM across schools with different demographic characteristics, but also that program implementation led to predicted changes in classroom

processes over time. These changes, in turn, seemed to result in certain intended outcomes.

Of particular interest were the significant, and more-than-expected, achievement gains in reading and math that were made by both the general education and the special education students, and the essential lack of difference in the classroom behaviors of the two groups. The achievement gains in math and reading for the special education students, for example, were found to be slightly over one year (gains far greater than the expected achievement gain of six months for students with similar special education classifications). In addition, the findings on teachers' and parents' appraisals of the ALEM suggest quite positive perceptions. Their positive assessments were further supported by the plans made by the participating schools to maintain and extend the program.

Recognizing the problem associated with making generalizations based on findings from a single program, results from the present study seem to be contrary to the prevalent findings in the literature regarding extant mainstreaming programs. They appear to suggest the viability of mainstreaming programs such as the ALEM as alternative delivery systems for providing effective special education and related services for handicapped students entirely in regular classroom settings. As such, they allow for the delivery of specialized services to handicapped students in settings where they share full membership in the intellectual and social life of the learning environment.

The kinds of highly positive findings on program implementation and effects that were obtained in this study, despite the difficulties routinely associated with the first year of implementation of innovative educational practices, are rather impressive, particularly in light of the fact that much of the energy of the school staff during the initial project year had to be devoted to removing major implementation stumbling blocks and problems that are bound to occur with the introduction of any innovative programs. Furthermore, the findings are especially encouraging considering the major restucturing required not only for implementation of the ALEM, but also for achieving an effective interface between the disparate administrative, organizational, and pedagogical approaches of general and special education. Furthermore, and perhaps more important, when these findings are viewed in the context of implementation of the "least restrictive environment" principle of Public Law 94-142, they suggest that full-time mainstreaming programs, like the ALEM, that are found to be demonstrably effective are special education alternatives which comply at an optimal level with the making of "appropriate" and "least restrictive environment" placements available to special education and general education students alike. A major policy implication of the findings on the feasibility and effectiveness of a full-time mainstreaming approach seems to be that more restrictive special education placements (e.g., self-contained special education classes, pull-out or partial mainstreaming alternatives such as resource rooms) are "exceptional" and should be considered only after a full-time mainstreaming approach has been tried and found to be ineffective.

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